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THE THIRD-STAGE LARVA AND PUPA OF *DEMODEMA BREVITARSIS* (BLANCHARD) (COLEOPTERA: SCARABAEIDAE: MELOLONTHINAE) FROM SOUTHERN BRAZIL

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Abstract.—The third-instar larva and pupa of *Demodema brevitarsis* (Blanchard) from Tapejara, Rio Grande do Sul, Brazil, are described. This is the first description of immature stages in this genus. A key to the larvae of seven genera of New World Macrodactylini (*sensu lato*), is given.

Key Words: *Demodema*, larva, pupa, taxonomy, Macrodactylini, key, America

The genus *Demodema* Blanchard of the Macrodactylini consists of eight species distributed from southern Brazil, Bolivia and Paraguay to Argentina (Evans 2003). Adults of *Demodema* species are commonly attracted to lights, but nothing is known about their habits and life cycle. From 1999 to 2001, the second author (JRS) collected white grubs feeding on soybean roots near Tapejara, Rio Grande do Sul, Brazil, and after rearing in the laboratory he obtained chafers identified as *D. brevitarsis* (Blanchard).

In this paper we describe for the first time the third-instar larva and pupa of *Demodema brevitarsis*. Technical terms are those of Ritcher (1966) and Morón (1986). Voucher specimens are deposited in the Entomological Collection Instituto de Ecología, Xalapa, Mexico (IEXA) and in the Insect Collection of Centro Nacional de Pesquisa de Trigo-Embrapa, Passo Fundo, RS, Brazil (CNPT).

Of the 1,066 species and 57 genera of Macrodactylini listed from the New World (Evans 2003), the larvae of only 10 species in six genera are described at present. Consequently, it is difficult to establish a set of diagnostic characters that distinguish the larvae of Macrodactylini from larvae of other tribes of Melolonthinae. However, based on Ritcher (1966), Costa et al. (1988), and our own studies, we propose the following combination of characters as diagnostic for larvae of Macrodactylini: head without ocelli (except in some *Macrodactylus*); mandibles without ventral stridulatory area; haptomerum usually present, epipharynx with 2 to 6 heli; lacinia with a row of 3 unci usually longitudinal; maxillary stridulatory area without anterior process; last antennal segment with a single, dorsal sensory spot; respiratory plates of spiracles not constricted (except in some *Macrodactylus*); raster with longitudinal palidia or with palidia absent; anal slit usually angulate or Y-shaped; lower anal lip with sagittal cleft or groove; each tarsal claw bearing 2 setae; and claws of

mesothoracic and metathoracic legs sometimes reduced in size.

Key to the Known Third-Instar Larvae of the Genera of Macrodactylini (*sensu* Evans 2003) from the Americas (modified from Ritcher 1966 and Costa et al. 1988)

1. Tormae united. Raster lyre-shaped and without palidia. 2
– Tormae not united (Fig. 3). Raster usually not lyre-shaped, with or without palidia. . . . 3
2. Raster with dense triangular patch of very short, stout conical setae on each side. Haptomerum of epipharynx with a transverse row of 2 to 4 heli. . . . . *Dichelonyx* Harris
– Raster with setae rather uniformly distributed. Haptomerum often absent. . . . . *Coenonycha* Horn
3. Haptomerum of epipharynx with 4 heli. All legs with well developed claws. Abdominal spiracles with lobes of respiratory plate constricted, surrounding bulla. Raster with a pair of short, longitudinal, parallel palidia. . . . . *Macrodactylus* Latreille
– Haptomerum of epipharynx with 5 or 6 heli (Fig. 3). Claws of mesothoracic and/or metathoracic legs reduced in size (Fig. 14). Abdominal spiracles with lobes of respiratory plate curved but not constricted around bulla (Fig. 15). Raster with single palidium on each side of septula, usually not parallel (Fig. 16). 4
4. All abdominal spiracles similar in size. . . . 5
– Abdominal spiracles 6 to 8 smaller in size than spiracles 1–5 (Fig. 1). 6
5. Raster with a pair of palidia parallel anteriorly and widely divergent posteriorly. Pallidia monostichous anteriorly and polystichous along lower anal lobes. Thoracic spiracles much larger than abdominal spiracles, with lobes of respiratory plate directed posteriorly. . . . . *Plectris* Serville
– Raster with a pair of palidia moderately divergent posteriorly. Pallidia entirely monostichous. Thoracic spiracles with lobes of respiratory plate directed ventrally . . . . . *Isonychus* Mannerheim
6. Claws of prothoracic legs long and sharp, claws of mesothoracic legs slightly shorter, claws of metathoracic legs minute. Raster with pair of longitudinal palidia that are not divergent posteriorly. . . . . *Anoplosiagum* Blanchard
– Claws of prothoracic and mesothoracic legs long and sharp, claws of metathoracic legs shorter (Figs. 12–14). Raster with a pair of monostichous palidia that are nearly parallel anteriorly and widely divergent posteriorly (Fig. 16). . . . . *Demodema* Blanchard

Larvae of *Demodema* Blanchard, 1850

The larval description of *Demodema brevitarsis* (Blanchard) is the first for the genus. Based on current knowledge of the larvae of Macrodactylini (*sensu lato*), the larva of *Demodema* are most similar morphologically to those of *Anoplosiagum* species. The known larva of *Demodema* have one pair of palidia widely divergent posteriorly, each palidium consisting of a row of 25–27 pali. The known larva of *Anoplosiagum* have one pair of longitudinal, feebly curved palidia, each palidium consisting of a row of 10-13 pali. Larvae of both genera have the abdominal spiracles 6 to 8 smaller than the spiracles 1-5, and the haptomerum of epipharinx with 6 stout heli.

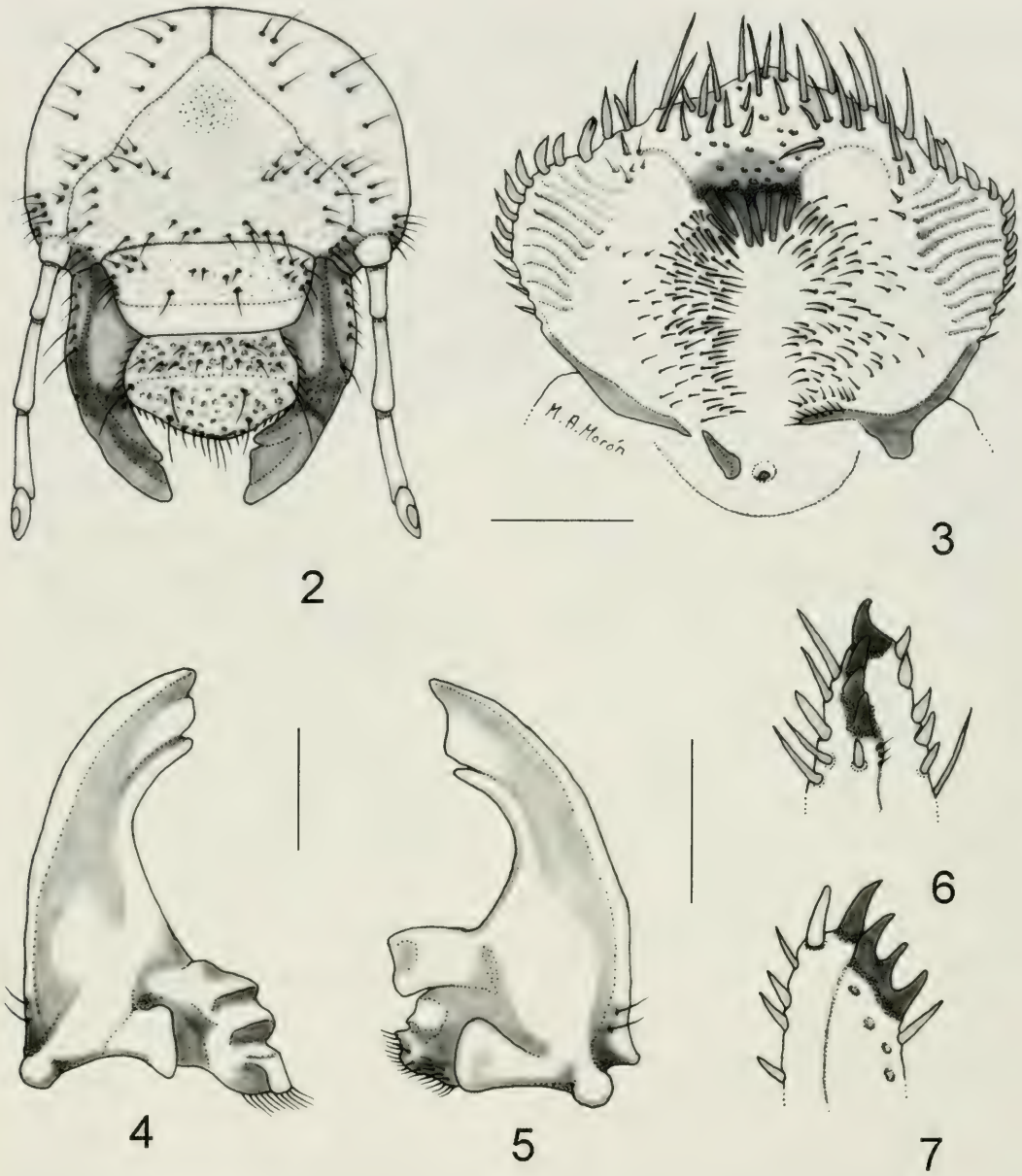
Demodema brevitarsis (Blanchard,1850) (Figs. 1–16)

Third-instar larva.—This description is based on 32 third instar larvae collected in soybean fields. Locality data: Brazil: State of Rio Grande do Sul, Tapejara (28°03′14″S; 52°07′20″W), 17-I-2001, 630 m altitude, J.R. Salvadori (12 larvae) (IEXA); same data (20 larvae) (CNPT).

Body (Fig. 1): Approximate dorsal length: 46–53 mm. Color yellowish white. Moderate vestiture of yellowish setae. *Head* (Figs. 1, 2): Maximum width of head capsule 4.5–4.9 mm. Cranium yellow, smooth to slightly rugose. Frons with 6–7 posterior frontal setae, 4 exterior frontal setae, 2–3 anterior angle setae, and 5 anterior frontal setae on each side. Dorsoepicranium with 4 setae on each side. Ocelli not defined. Clypeus subtrapezoidal with 7–8 exterior clypeal setae on each side and 2 central setae. Preclypeus weakly sclerotized, without setae. Labrum nearly symmetrical with 12 posterior setae, one long lateral seta on each side, 2 long central setae and 2 long anterior

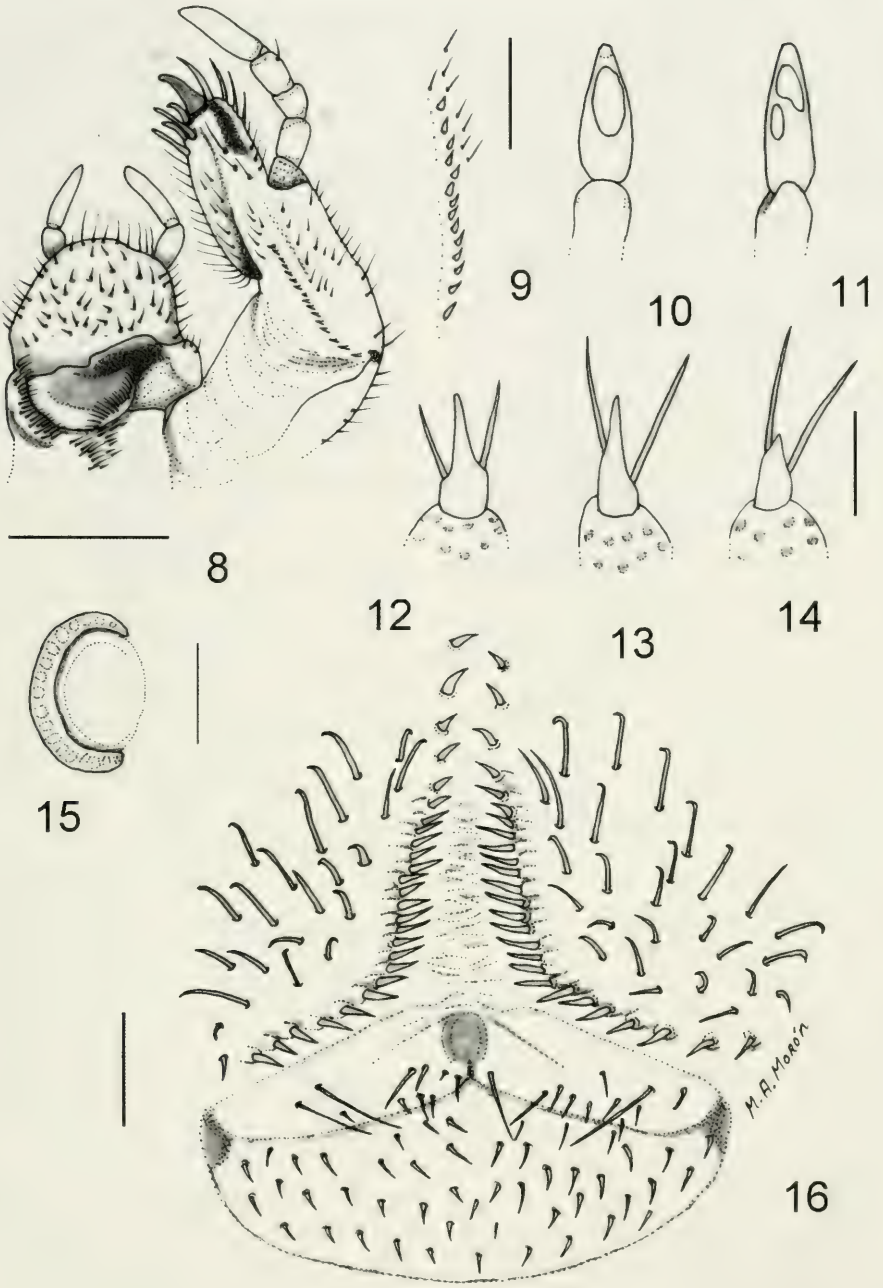
Fig. 1. *Demodema brevitarsis*, third-instar larva. Scale line = 2 mm.

setae. Epipharynx (Fig. 3): Corypha with 15–18 stout setae. Haptomerum wide, prominent, with 8–10 sensilla, behind process a transverse irregular row of 6 stout heli. Acanthoparia with 12 curved setae, progressively enlarged toward anterior border; penultimate seta on each side with apex narrowly cleft. Chaetoparia with 75–95 setae on each side. Proplegmatia absent. Plegmatia present, each plegmatium with 9–10 long plegmata. Dexiotorma wide and long, without pternotorma. Laeotorma narrow and elongated, with subquadrate pternororma. Nesia with small sensorial cone and large sclerotized plate. Laeophoba abundant. Dexiophoba scarce. Crepis vague. Mandibles (Figs. 4–5) bicolored, right mandible with 1 apical scissorial tooth and wide blade anterior to scissorial notch and 1 scissorial tooth posterior to notch. Stridulatory area absent. Molar area with 3 lobes. Calx wide. Brustia formed by 12–14 setae.



Figs. 2–7. *Demodema brevitarsis*, third-instar larva. 2, Head, frontal view. 3, Epipharynx. 4, Right mandible, ventral view. 5, Left mandible, ventral view. 6, Left maxilla, internal view of distal part. 7, Left maxilla, ventral view of distal part. Scale lines = 1 mm, except figs. 3, 6–7 = 0.5 mm.

Lateral edge with 2 basal setae. Left mandible (Fig. 5) with 1 apical scissorial tooth and wide blade anterior to scissorial notch and 1 scissorial tooth posterior to notch. Stridulatory area absent. Molar area with 2 lobes. Acia absent. Brustia formed by 18–22 short setae. Lateral edge with 2 basal setae. Maxilla: Galea and lacinia fused (Fig. 8) forming mala. Mala with large uncus at apex and 3 subterminal large unci (Figs. 6–7). Stridulatory area (Fig. 9) with row of



Figs. 8–16. *Demodema brevitarsis*, third-instar larva. 8, Hypopharynx and right maxilla, dorsal view. 9, Stridulatory area of maxilla. 10, Last antennal segment, dorsal view. 11, Last antennal segment, ventral view. 12, Tarsungulus of anterior leg. 13, Tarsungulus of middle leg. 14, Tarsungulus of posterior leg. 15, prothoracic spiracle. 16, Raster. Scale lines = 0.5 mm, except fig. 8 = 1 mm.

14–16 acute, small teeth, without distal, truncate process. Labium (Fig. 8): Dorsal surface with short, wide truncate process. Hypopharyngeal sclerome with abundant phobae on both laterobasal sides. Glossa with 22–26 setae at middle, and 1 lateral row formed by 7–9 setae on each side. Antenna: Second segment 2

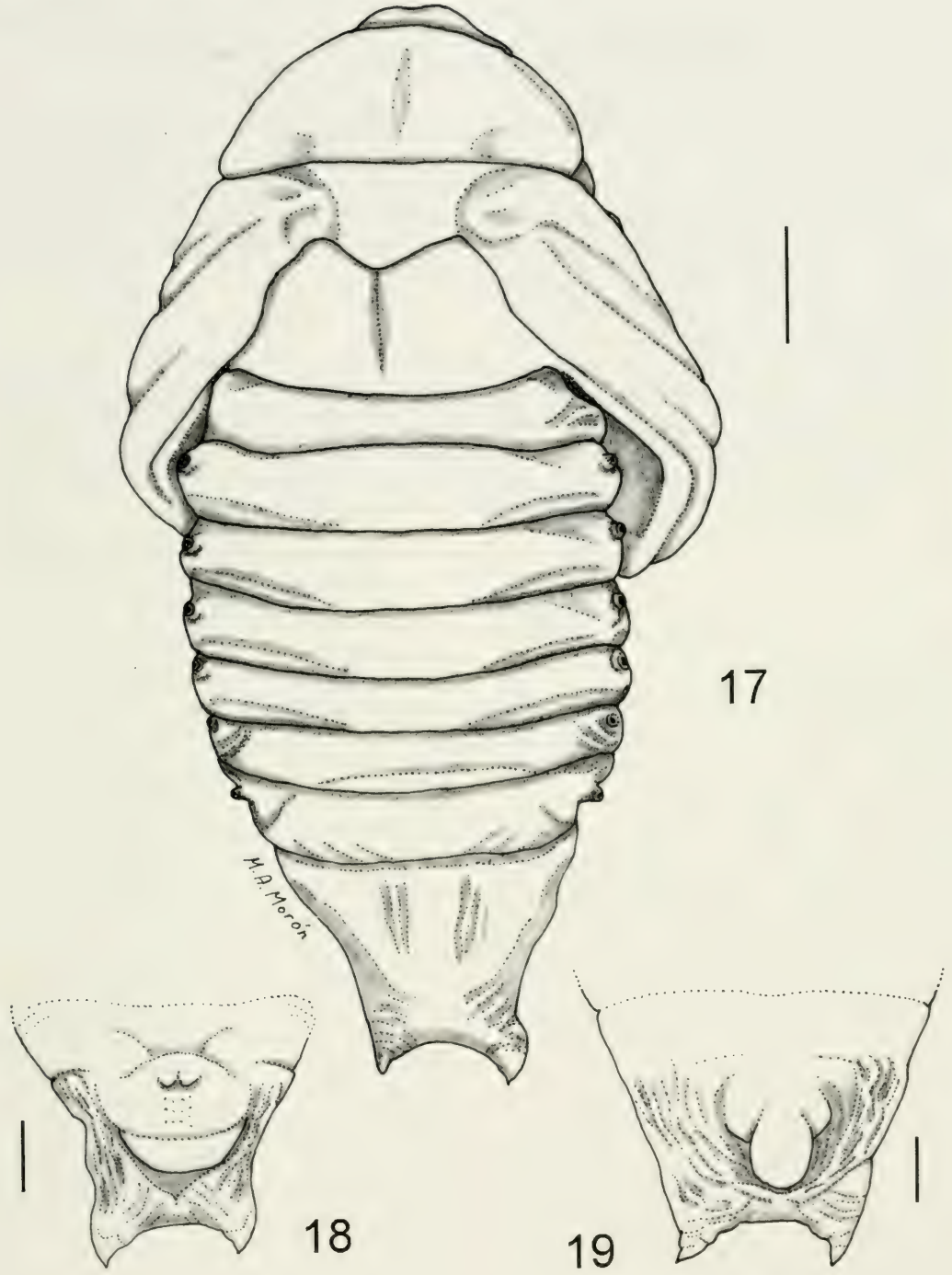
times longer than first segment, and nearly as long as third segment. Surface of last segment (Figs. 10–11) with 1 dorsal and 2–3 ventral sensory spots.

Thorax (Fig. 1): Prothorax with small anterolateral areas weakly sclerotized. Thoracic spiracles (Fig. 15) with C-shaped respiratory plate 0.65 mm high and 0.45 mm wide; plate with 10–12 holes across diameter at middle; holes narrowly oval. Dorsoventral diameter of bulla 4 times longer than width of the narrowed respiratory plate. Distance between two lobes of respiratory plate widely open. Dorsal surface of each segment with scattered transverse rows of medium size, erect setae. Legs: Tarsungulus of anterior and middle legs (Figs. 12–13) with long and acute apex. Tarsungulus of posterior legs (Fig. 14) with short and sharply pointed apex. All with 1 basal seta and 1 preapical seta.

Abdomen (Fig. 1): Spiracles similar to those on thorax but variable in size. Spiracle of abdominal segment I: 0.55 mm high and 0.35 mm wide; segment II: 0.60 mm high and 0.30 mm wide; segment III: 0.55 mm high and 0.28 mm wide; segment IV: 0.60 mm high and 0.35 mm wide; segment V: 0.45 mm high and 0.30 mm wide; segments VI–VII: 0.40 mm high and 0.25 mm wide; and segment VIII: 0.30 mm high and 0.20 mm wide. Dorsal areas of segments I–VII with many scattered short, spinelike setae and irregular, transverse rows of slender, long setae. Dorsal areas of segments VIII and IX only with irregular, transverse rows of slender, long setae. Dorsal area of segment X with mixture of long, short, and medium size setae. Segments IX and X not fused dorsally. Spiracular area and pleural lobes of abdominal segments I–IX with only a few setae. Raster (Fig. 16) with pair of palidia widely angled and divergent toward anal border, each consisting of row of 25–27 pali. Septula wide, open posteriorly, with finely rugose surface. Tegilla composed of 25–28 hook-tipped, long setae. Lower anal lip with a shallow, rounded fovea before brief cleft on middle of border, and scattered mixture of short and long setae along anal border.

Pupa.—This description is based on 18 pupae reared from third instar larvae collected on soybean roots. Locality data: Brazil: State of Rio Grande do Sul, Tapejara, 1-VII-1999, J. R. Salvadori (1 male pupa, 8 female pupae) (IEXA); 3 male pupae, 6 female pupae (CNPT).

Form: Body elongate, robust, exarate (Fig. 17). Body length: 19–21 mm. Reddish yellow. With very fine velvety microtrichia, mainly on last abdominal segments. *Head*: Strongly reflexed downward. Antenna and mouth parts clearly separated. Ocular canthus and compound eyes well-differentiated. Clypeus convex. Labrum tumid. Surface of frons convex. *Thorax*: Pronotal disk slightly convex, with very shallow depression along midline. Meso- and metanota differentiated. Mesoscutellum widely angled, apex rounded. Metascutellum not defined. Pteroteca widened, with apex rounded, free, compressed around body; hind wing teca slightly longer than elytral teca. Meso-metasternal area without prominence. Protibia with 2 short process on external border. Meso- and metatibiae each with 2 rounded, short apical spurs. All tarsomeres vaguely defined. *Abdomen:* Tergites I–VII convex, without dioneiform organs. Tergites VIII–X fused, crearly narrowed toward end of body. Last tergite with paired, short, conical urogomphi, apically sharply pointed (Figs. 17–19). Tergo-lateral tubercles absent. Spiracle I elongate, not prominent, covered by hind-wing teca. Spiracles II–IV tuberculiform, with open atrium and ringlike, sclerotized peritreme. Spiracles V–VI not prominent, opened, with ringlike narrow peritreme. Spiracle VII tuberculiform, with



Figs. 17–19. *Demodema brevitarsis*, pupa. 17, female, dorsal view. 18, apex of female abdomen, ventral view. 19, apex of male abdomen, ventral view. Scale lines = 1 mm, except fig. 17 = 2 mm.

open atrium and narrow peritreme. Spiracle VIII closed, surrounded by fine rugae. Sternites II–VII convex. Last sternite with genital ampulla widely rounded in female pupa (Fig. 18) and narrowly prominent in male pupa (Fig. 19).

Biological notes.—Larvae were found feeding on roots of *Glycine max* L. (Leguminosae) growing in common oxisol of the humid regime (hapludox). Depending on soil moisture, larvae and pupae were located at 18–25 cm deep. In the same locality, the larvae of this species have been found also on roots of corn (*Zea mays* L.), wheat (*Triticum eastivum* L.), "aveia-preta" (*Avena strigosa* L.), and "azevem" (*Lolium multiflorum* Lam.) (Gramineae). Adults fly between December and February, and are attracted to electric lights. No host plants are known for the adults. The life cycle apparently is not regular. Sometimes the adults fly each year or in other times fly every two years; this is under study by the second author (JRS).

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